NON-PUBLIC?: N
ACCESSION #: 9112100165
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Callaway Plant Unit 1 PAGE: 1 OF 4

DOCKET NUMBER: 05000483

TITLE: A Reactor Trip Due To A Failure Of A Gating/Sequencing Card In The Inverter For A 120 Volt AC Instrument Bus
EVENT DATE: 11/05/91 LER #: 91-006-00 REPORT DATE: 12/05/91

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: R.D. Affolter, Superintendent, TELEPHONE: (314) 676-8240
Systems Engineering

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: EI COMPONENT: ECBD MANUFACTURER: W351
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On 11/5/91, at 1031 CST, a reactor trip occurred due to the failure of a gating/sequencing card in the inverter (NN12) supplying a 120 volt AC safety-related instrument bus (NN02). The NN02 bus was de-energized. This failed a controlling feedwater channel resulting in a high water level in the 'A' steam generator which caused a Turbine Trip signal. The reactor trip occurred on a Unit Trip/Turbine Trip signal. A Feedwater Isolation and an Auxiliary Feedwater Actuation were generated by design. The plant was in Mode 1 - Power Operations at 100 percent reactor power. The reactor coolant system temperature was 588 degrees F and the pressure was 2237 psig. The licensed operators recovered from the trip and the Engineered Safety Feature actuations via plant procedures. The NN02 bus was
nergized from backup power via the Sola transformer at 1109. The failed inverter card was replaced and the inverter lined up to NN02 at

0242 on 11/6/91.

The plant was returned to Mode 1 - Power Operations at 2018 on 11/6/91. Corrective actions include: an analysis of the card failure; a determination if additional preventive maintenance for this card is necessary; procedures will be developed with NN bus load information for operator use; and operator training on this type of event will be developed and performed.

END OF ABSTRACT

BASIS FOR REPORTABILITY

On 11/5/91, at 1031 CST, a reactor trip occurred upon a turbine trip after the loss of control power to an instrument bus. This event is reportable per 10CFR50.73(a)(2)(iv) to report the Reactor Protection System(1)_/ and Engineering Safety Feature (ESF)(2)_/ actuations (i.e. Feedwater Isolation and Auxiliary Feedwater Actuation).

PLANT CONDITIONS AT TIME OF EVENT:

Mode 1 - Power Operations 100 percent reactor power
Reactor Coolant System (RCS): Temperature (average) - 588 degrees F; Pressure - 2237 psig

DESCRIPTION OF EVENT:

On 11/5/91, at 0645 CST, utility engineers were notified by the licensed operators of abnormal noise in the 120 volt AC safety-related instrument inverter (NN12)(3)_/. Electricians and engineers began investigating the noise in the NN12 cabinet. At 1029, the NN12 inverter failed and de-energized its supplied bus NN02(4)_/. This resulted in trip signals being sent for one channel in each of the four steam generators. The multiple failed channels included the controlling channel(5)_/ for the 'A' and 'D' steam generator feedwater control systems. This caused the feedwater demand signals in both steam generators to increase feedwater flow, thus raising their water levels.

In the Control Room, numerous alarms and annunciators (6)_/ were received when NN12 failed. Some of these alarms and failed indications gave the licensed operators conflicting information, such as low steam generator level alarms and indications while two steam generator real feedwater flows and levels were increasing. The licensed operators knew that NN02 had de-energized, but could not immediately determine the effects on the

plant. They concentrated on stabilizing steam generator 'D' level since its level was rising faster than the others and its narrow range level recorder had pegged. The operators selected to the operable controlling channel for 'D' steam generator, but did not change the controlling channel for 'A' steam generator since its level change was slower. The level rise in 'D' steam generator was reversed, but now more feedwater was made available to the 'A' steam generator and its level quickly reached the high level trip setpoint. At 1031, two minutes after NN02 was de-energized, the reactor tripped as the result of a Unit Trip/Turbine Trip signal. The high 'A' steam generator level had caused the Turbine Trip. A Feedwater Isolation and an Auxiliary Feedwater Actuation were generated by design with the reactor trip.

The licensed operators recovered from the trip and the Engineered Safety Feature actuations via plant procedure, The NN02 bus was energized from backup power via the Sola transformer (7)_/ at 1109. The failed inverter card was replaced and the inverter lined up to NN02 at 0242 on 11/6/91. The plant was returned to Mode 1 - Power Operations at 2018 at 11/6/91.

ROOT CAUSE:

The NN12 inverter gating/sequencing card failed (8)_/. This resulted in a rising water level in both the 'A' and 'D' steam generators since the controlling level channels selected caused the feedwater regulating valves to go full open. The high level trip setpoint was reached in 'A' steam generator before the operators could select away from the failed channel and stabilize its level rise.

CONTRIBUTING FACTORS:

1. The cause of the gating/sequencing card failure has not been determined. There is no indication that the NN12 cabinet investigation by the electricians and engineers contributed to the card failure.

2. At the time of this event, a review was being performed to determine what components would be affected by a loss of NN02. This was preparation for an outage on this bus that had been scheduled for the following week. The gathering of this information had been on-going for several weeks and was not completed. Consequently, this information was not yet available to the operators. Although the operators selected to the correct controlling channel for one steam generator, they did not immediately know the extent of the instrumentation failures due to the de-energized NN02 bus.

CORRECTIVE ACTIONS:

1. A degraded gating/sequencing card in a similar inverter (NN14) had been replaced during planned maintenance on 10/25/91. Both cards will be sent to the vendor for testing to determine failure cause. When the results of this testing are completed, the following additional evaluations will be performed as applicable.

a. An evaluation will be performed to determine if additional preventive maintenance is necessary.

b. An evaluation will be performed to determine whether this type of card or components on it should be replaced with a different model.

2. The project to identify components affected by loss of NN02 has been completed. Similar research will be performed on the remaining two buses, NN01 and NN03. When this research is completed, the following actions will be taken:

a. Procedures will be developed to make this information readily available to the operators.

b. Classroom and simulator training will be developed and performed on scenarios similar to this event.

SAFETY SIGNIFICANCE:

The plant safety systems performed as required. There was no detrimental effect on plant equipment as a result of the actuations. There was no threat to the health and safety of the public.

PREVIOUS OCCURRENCES:

None

FOOTNOTES:

The system and component codes below are from the IEEE Standards 805-1983 and 803A-1983, respectively.

1. System - JC
2. System - JE

3. System - EI, Component - INVT
4. System - EE, Component - BU
5. System - JB, Component - TC
6. System - IB
7. System - EI, Component - XFMR
8. System - EI, Component - ECBD
Westinghouse - model no. 3443072G01

UNION
ELECTRIC

Callaway Plant

December 5, 1991

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ULNRC-2526
Gentlemen:

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
FACILITY OPERATING LICENSE NPF-30
LICENSEE EVENT REPORT 91-006-00
A REACTOR TRIP DUE TO A FAILURE OF A
GATING/SEQUENCING CARD IN THE INVERTER
FOR A 120 VOLT AC INSTRUMENT BUS

The enclosed Licensee Event Report is submitted pursuant to 10 CFR 50.73(a)(2)(iv) concerning a reactor trip due to a failure of a gating/sequencing card in the inverter for a 120 volt AC instrument bus.

J. D. Blosser
Manager, Callaway Plant

JDB/TPS/MAH/lrj

Enclosure

cc: Distribution attached

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cc distribution for ULNRC-2526

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